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NASA Procedural Requirements

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Appendix A. Sample Technology Commercialization Plan Format

What is a "Technology Commercialization Plan"?

A Technology Commercialization Plan addresses specific technological assets targeted for commercialization. It should be prepared by the NASA activity manager with the assistance of the CTO. Such a plan is a tool whose function is not only to serve internal NASA management needs, but also to supply information to external organizations that may be critical to success. Recognizing that premature dissemination of information disclosing a specific technology may create a statutory bar precluding NASA or its partners from obtaining patent protection, each Center's Patent Counsel must approve the technology as releasable to the public before information disclosing the technology may be publicly released. Thus, before a Technology Commercialization Plan disclosing information on a particular technology may be released to external organizations, the technology must be reviewed by Patent Counsel and approved for public release. Additionally, whether or not NASA may release information on a specific technology to an external entity is dependent on NASA's rights in the technology and whether NASA has obtained intellectual property protection on the technology. Release of a Technology Commercialization Plan may require the execution of a Nondisclosure Agreement by the receiving party. Again, consult your Center's Patent Counsel. The Technology Commercialization Plan should be used as a road map that establishes objectives, strategies and an approach to achieving those objectives. Utilizing such a road map not

only facilitates internal communications, but encourages staying the planned course. Of major importance is that the Technology Commercialization Plan should be reviewed frequently, and to remain useful, needs to be updated accordingly. *Always remember that for help with any aspect of a Technology Commercialization Plan, contact your Center's Commercial Technology Office.*

So, what needs to be in it?

There are several standard sections that should appear in every Commercialization Plan. The important thing to remember is to customize the Technology Commercialization Plan to fit your particular venture. The following sections are a good guideline to start your first plan:

Executive Summary

This may very well be the most important section of your Commercialization Plan. Often times the Executive Summary is the ONLY portion of a Technology Commercialization Plan that is read by outside sources. The Executive Summary should be concise, but informative about potential innovation(s) while creating interest. Describe the potential product(s), their unique competitive advantage, and development and technical milestones.

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Product Description

Clearly describe the commercial product(s) in terms that a "layperson" could understand, and include in the description:

a. A technology description that is suitable for review by individuals with technical and business backgrounds;

b. How the product(s) will benefit the customer (what is its uniqueness); and

c. Projections of technology readiness (e.g., how long and how many resources will it take to produce a transferable product).

Target Market and Competition

This section should demonstrate strong market knowledge and list those market area(s) to be targeted. Included in this section should be:

a. A description of the target applications, including (if appropriate) a priority ranking that identifies the highest impact applications that deserve primary attention. Include possible fields of use for later licensing action;

b. A market analysis and research reports that show the market need for the particular product(s) and lists key customers;

c. An overview of the tactics to be used to connect to industry, which may include news releases, publications in government periodicals, direct mail, networking, technology briefings, and presentations at technical conferences, trade shows, or workshops;

d. The timelines and action steps to develop early partnerships, collaborations, field testing, etc;

e. A description of technical expertise, facilities, and other resources that NASA could obtain through collaborations with companies;

f. The inclusion of comprehensive target company lists is not necessary for this plan, but the identification of the action step for identifying target companies is necessary;

g. The intellectual property protection and business development tactics, including marketing plans, need to mesh with the technical development and precompetitive partnering activities; and

h. Specific patent and licensing strategy.

Management Description

Identify the key business and technical management personnel. Include technical experience and skills, and show how these individuals give a distinct competitive advantage to the venture.

Operations

Describe the plan and schedule to develop and/or produce the end product, and include:

a. An understanding of the technologies that will be applied to produce the planned product and an understanding of the new technology as it may impact the commercial market. This step consists of developing an understanding of the unique capabilities, limitations, characteristics, or other features of the technology. To do this, the planner must develop an understanding of the state of the art in the intended fields of use. Questions to be answered include the following:

(1) What are the competitive technologies? Emerging technologies? **Note:** Information on competitive technologies is derived from Web-based searches, previous market and technology reviews, and direct contact with industry experts.

(2) Is the new technology expected to be better than existing technology - in what ways? **Example:** A new joint may be a stronger design, allowing the assembly to handle much higher service loads.

(3) Will it be faster - by what measure? Example: A new joining procedure may take fewer steps, allowing the manufacturer to double the process throughput.

(4) Will it be cheaper - as a unit or in an assembly? Example: A new joint may not require an adhesive where the existing technology always requires this expense.

b. Potential development obstacles. Questions to be answered include:

(1) What are the known potential barriers to market acceptance? Example: The primary user may be in a heavily regulated industry, e.g., involving public safety, where new ideas (even great ones) face many months or years of acceptance testing and certification.

(2) Will the new technology eliminate (or add) an environmental problem? Example: The new joining technique may eliminate a machining step that required expensive capture

and disposal costs for hazardous waste scrap.

c. Relationship between the commercialization activity and the mission-related activity, including the commercial use of space. The goal of this step is to develop an understanding of the technology needs in the market that may be related to the mission technology program. If NASA's mission objectives can be met while making accommodations to enhance the value to industry, there are improved chances for a successful commercialization. A common approach to understanding the market is to begin by determining the value of the new technology to a company and its customers. Companies will consider investing in a new technology when it has the potential to increase sales or to decrease costs either for the company or its customers. Even if NASA's candidate technology shows that kind of promise, it still must compete with the company's other investment opportunities. Searching secondary sources of information, such as published reports, databases, and the Internet, only provides basic data. Interviews with industry experts (i.e., primary information sources) will be key to understanding the market issues that will affect the chances for commercialization of a new technology. Examples may provide some insight.

Example: NASA will develop a new material that is expected to increase the operating life of bearings by a factor of 10. With some research, it is discovered that an increased operating life is desirable to industry, but that doubling is all that is required if the cost is not increased. The expected cost of NASA's technology will lead to an unacceptable cost increase. If the new material can be developed for less endurance and lower cost and still meet the objective of the NASA program, it may be better to change the program direction. Many other issues need to be considered (e.g., licensing, manufacturing, distribution channels, emerging competing materials), but this example demonstrates the process of identifying an industry need and modifying the NASA direction to satisfy both needs early in the planning stage.

Example: NASA expects to develop a new approach to modeling scientific processes. Early prototypes show promise. Science domains consisting of expert experience, engineering principles, scientific constants, and others can be created and manipulated with high-level graphical user interfaces. Capabilities are expected to be unparalleled in industry. Expectations for commercialization appear to be very high. Early research, however, uncovers the fact that software companies that develop and sell similar scientific products have a backlog of projects needed by their customers. Their development planning cycle is projected for 2 years with new software and revisions that are known to be profitable. Their programming staff is overloaded, and the prospects for staff growth are dim. In this environment, companies will be reluctant to pursue external opportunities, even if they are attractive. In this example, careful research uncovered a significant barrier to commercialization that was not initially apparent. Possibilities may still exist for working with start-up companies, incubator companies, or other entrepreneurs.

d. Approaches for connecting with the market. Presuming that the new technology can be shown to be of sufficient value to industry, the next consideration is to analyze the possible paths to market. Many options can be explored and different models may make sense for different situations. Below are some examples:

(1) Develop a partnership with a company early in the program. Example: The software example mentioned above may benefit from a collaboration early on, where the company may be much more likely to develop a commercial version. Also, specific technical expertise from a company may be brought into a program to save NASA time

and money in developing related technology.

(2) Develop a partnership with several companies or a consortium early in the program. Example: NASA plans to perform research on an enabling hazardous waste treatment method. Funding and staff exchanges may be possible based on a consortium model. The outcome could include a wider distribution of the results and quicker commercialization. In addition, NASA would be assured of commercial sources for treating its hazardous waste inventory.

(3) Solicit peer reviews of the program while there is time to influence the program to optimize its market value. Example: A new technique to synthesize a chemical has been demonstrated in the lab. Before moving to the next phase, it may be beneficial to probe the industry to determine which variations on the proposed method would bring the most value to industry.

(4) Wait until the core technology is proven on the bench, then form partnerships. **Example Example:** Many trials and failures often characterize materials development. It may make sense to wait until confidence is high before expending the resources to develop collaborations. Collaborations often are necessary in order to have larger batch samples made for end users and to have materials characterization tests performed. (Wait until moderately advanced prototypes are ready, then seek company support or licensees. Example: NASA clearly has the leading experts in the field, work has progressed well, and the new technology may be important to the Nation's position in the global market. NASA may want to carry the development work to the final stages and file for patent before publicizing the work. This approach gives U.S. companies a better chance of licensing and using the technology before the offshore competition can react).

(5) For technologies that are useful to industry, an active approach to commercialization should be selected, such as publishing results, presenting papers, holding workshops, marketing the technology via the Web, or participating in trade shows.

e. Intellectual Property (IP) protection considerations early in the program. NASA may license Government-owned technology only if the Government owns a patent, patent application, or copyright on the technology. If patentable technologies, including copyrightable software, are expected to arise from the program, your Center's Patent Counsel should be consulted to determine whether the Government or the industry partner will obtain or retain the Intellectual Property, and language concerning this issue should be contained in the contract or agreement. Government inventions with market potential should be considered for patenting so that they may be licensed and license royalty income obtained to offset some or all of the government cost to commercialize the technology.

f. Characterize the level of support that the responsible technical organization will commit to the process after a license has been signed. Success is often assured or lost based on the transfer of know-how along with the intellectual property rights.

g. Identify sufficient control processes that will ensure that the innovators are allowed to meet their mission requirements while simultaneously making necessary contributions to the commercialization objective.

h. Identify a target range of milestones for expected commercialization success.

(1) Develop specific milestones when partnerships are anticipated to be in place.

(2) Develop specific language for technology commercialization requirements to be

placed, in applicable cases, in task orders, or statements of work to be performed by contractors or recipients.

i. Document the Plan. The final step is to document the plan based on the findings of the analysis of the technology and the market. Before a plan can be documented, key conclusions and decisions need to be made. Based on the research and analysis outlined above:

(1) Identify which parts of the technology development program will likely produce commercially attractive technology.

(2) Adjust program plans appropriately to accommodate commercially important features.

(3) Create a commercialization roadmap.

(4) Decide whether the commercialization effort (and technology development effort) will benefit from early industry involvement.

(5) Determine the most effective level of industry involvement.

(6) Create the general plan for protecting important intellectual property.

(7) Anticipate the mechanisms for marketing the technology.

The plan should be a product of technical staff, technical management, commercial technology office staff, and Patent Counsel. Each of these contributors might draw on external sources for information and advice. In fact, an external source could very well facilitate the development of the plan.

Risk Management

For commercialization activities associated with programs and projects which follow the processes and requirements of NPR 7120.5 (NASA Program and Project Management Processes and Requirements), clearly describe the approach to be taken to risk management. This would include a description of the responsibilities of all parties to any partnerships or collaborations among the government, industry, and/or academia in sharing risks of the endeavor.

Schedule

Provide the schedule for development, production and marketing of the end product(s).

Appendices

Include any relevant attachments (e.g., patents, market research studies, agreements) and a definition of terms.

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